ERT
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environmental and engineering excellence

ERT Project No. 0005-192
ERT Ref. No. 101-JDM-821

August 18, 1986

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Boulevard
St. Louis Park, MN 55416

Dear Mr. Grube:

Enclosed please find four (4) copies of the report of analysis for the set of water samples submitted from the GAC plant on July 15, 1986. Based on your instructions a copy of this report was also sent via Federal Express to D. Bicknell, US EPA; R. Clark, Minnesota Department of Health; and D. Robohm, Minnesota PCA.

If you have any questions or comments, please feel free to contact W. Gary Wilson, Thomas Trainor, or me.

Sincerely yours,

Joseph D. Mastone
Laboratory Manager
Analytical Chemistry Services

JDM/r

Enclosure

cc: M. Devine
A. Paradice
T. Trainor
W. G. Wilson
D. Bicknell - US EPA
R. Clark - MN DE
D. Robohm - MN PCA

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

ERT Project No. 0005-192
August, 1986

Prepared for

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka, Blvd.
St. Louis Park, MN 55416

Prepared by

ERT, A Resource Engineering Company
696 Virginia Road, Concord, Massachusetts 01742

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples received by the ERT Analytical Chemistry Laboratory on July 22, 1986. The samples were to be analyzed for selected polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed them to be packaged properly and received in good condition, with the exception of the following: one sample, ERT No. 37016, Field ID B-02, consisted of two 1-liter amber bottles rather than four as listed on the chain of custody. The cap on one of the 1-liter amber bottles, ERT No. 37017, Field ID TD-02, was received cracked. The cap on one 1-liter amber bottle, ERT No. 3718, Field ID MS-02, was identified as "blank."

Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in: ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in Water", as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June-August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June-August, 1986, ERT Document No. P-D209-129-1, July, 1986 were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted samples based on the following frequency:

a) Laboratory method blank, 5% - one for every (20) samples submitted.
b) Laboratory solvent blank, 10% - one for every (10) samples submitted.
c) Laboratory method spikes, 5% - one for every (20) samples submitted.

All samples and quality control samples were fortified prior to extraction with selected deuterated PAH surrogate compounds, i.e., naphthalene-d_8, fluorene-d_{10}, and chrysene d_{12}, at a sample concentration level of approximately 10 ng/l (ppt). The following criteria, based on percent recovery, was to be utilized for the determination of data validity for each sample:

Surrogate	Minimum Mean (%)	Mean (%)	Standard Deviation (%)	95% Confidence Limits
Naphthalene-d_8	42	72	15	42-102
Fluorene-d_{10}	60	94	17	60-128
Chrysene-d_{12}	20	30	12	10-54

Various corrective action steps, as described in the QA plan, were to be initiated whenever the recovery of any one surrogate is found to be below the 95% confidence limit.

RESULTS OF ANALYSIS

The sampling report, analytical results report, the method spike recovery report, and the surrogate recovery report are presented in the attached tables.

No problems were encountered during sample extractions and analyses.

DISCUSSION

A review of naphthalene-d_8, surrogate recoveries indicated that four (4) of the submitted samples were below the 95% confidence interval of 42-102%:

Field Identification	ERT Number	Naphthalene-d_8 % Recovery
W-02	37015	35
B-02	37016	24
TD-02	37107	27
MS-02,	37018	34

The mean recovery for the naphthalene-d_8 surrogate in the samples submitted from the GAC site, including the laboratory method blank and method spike was found to be 35.8%. This value was below the minimum mean value of 42%.

Various corrective action steps, including review of calculations, examination of internal standard and surrogate solutions for degradation and contamination, and an instrument performance check, were performed. These steps did not provide any conclusive insight or explanation for the apparent low recovery of the naphthalene-d_8 surrogate.

In addition, it should be noted that the analytical results for the method spike recovery sample for the eight (8) selected compounds were found to be within the method spike criteria for data validity, except for benzo (g,h,i) perylene which was 9% (rather than 10%). However, the average recovery for the target compounds was 38%, within the 20%-150% target range.

The ERT Analytical Laboratory does not feel that the naphthalene-d_8, surrogate recovery (<42%) for the four (4) samples compromises the validity of the data as reported. Based on the recovery of the selected PAH compounds in the method spike (matrix fortification) sample, the method is capable of identifying and quantifying the compounds to be analyzed utilizing this analytical method.

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
CITY OF ST. LOUIS PARK, MN

ppt ANALYSIS OF PAH IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	T-02
2.	ERT SAMPLE NUMBER:	37014
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	7/22/86
5.	DATE RECEIVED:	7/23/86
6.	DATE EXTRACTED:	7/28/86
7.	DATE ANALYZED:	8/13/86
8.	GC/MS FILE #:	37014B
9.	GC/MS TAPE #:	MSD1
10.	CORRESPONDING DFTPP FILE #:	DFTPP07
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 37018
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 37134
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	BLANK 2
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	STD 13
15.	COMMENTS: NA = NOT AVAILABLE	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	W-02
2.	ERT SAMPLE NUMBER:	37015
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	7/22/86
5.	DATE RECEIVED:	7/23/86
6.	DATE EXTRACTED:	7/28/86
7.	DATE ANALYZED:	8/13/86
8.	GC/MS FILE #:	37015C
9.	GC/MS TAPE #:	MSD1
10.	CORRESPONDING DFTPP FILE #:	DFTPP08
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 37018
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 37134
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	BLANK 2
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	STD 14
15.	COMMENTS: NA = NOT AVAILABLE	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	B-02
2.	ERT SAMPLE NUMBER:	37016
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	7/22/86
5.	DATE RECEIVED:	7/23/86
6.	DATE EXTRACTED:	7/28/86
7.	DATE ANALYZED:	8/13/86
8.	GC/MS FILE #:	37016B
9.	GC/MS TAPE #:	MSD1
10.	CORRESPONDING DFTPP FILE #:	DFTPP07
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 37018
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 37134
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	BLANK 2
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	STD 13
15.	COMMENTS: NA = NOT AVAILABLE	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	TD-02
2.	ERT SAMPLE NUMBER:	37017
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	7/22/86
5.	DATE RECEIVED:	7/23/86
6.	DATE EXTRACTED:	7/28/86
7.	DATE ANALYZED:	8/13/86
8.	GC/MS FILE #:	37017B
9.	GC/MS TAPE #:	MSD1
10.	CORRESPONDING DFTPP FILE #:	DFTPP07
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 37018
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 37134
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	BLANK 2
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	STD 13
15.	COMMENTS: NA = NOT AVAILABLE	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	MS-02
2.	ERT SAMPLE NUMBER:	37018
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	7/22/86
5.	DATE RECEIVED:	7/23/86
6.	DATE EXTRACTED:	7/28/86
7.	DATE ANALYZED:	8/13/86
8.	GC/MS FILE #:	37018C
9.	GC/MS TAPE #:	MSD1
10.	CORRESPONDING DFTPP FILE #:	DFTPP08
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 37018
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 37134
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	BLANK 2
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	STD 14
15.	COMMENTS: NA = NOT AVAILABLE	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	MB860527
2.	ERT SAMPLE NUMBER:	37134
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	NA
5.	DATE RECEIVED:	NA
6.	DATE EXTRACTED:	7/28/86
7.	DATE ANALYZED:	8/15/86
8.	GC/MS FILE #:	37134C
9.	GC/MS TAPE #:	MSD1
10.	CORRESPONDING DFTPP FILE #:	DFTPP08
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 37018
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 37134
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	BLANK 2
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	STD 14
15.	COMMENTS: NA = NOT AVAILABLE	

ERT ANALYTICAL LABORATORY

ANALYTICAL RESULTS REPORT

CITY OF ST. LOUIS PARK, MN

ppt ANALYSIS OF PAH IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: T-02 ERT NO.: 37014

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	<3.4
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	<1.3
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: W-02 ERT NO.: 37015

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	7.7
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	7.5
ACENAPHTHENE	11
DIBENZOFURAN	<1.2
FLUORENE	4.5
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	<3.4
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	4.5
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	35
TOTAL PAH'S	35

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: B-02 ERT NO.: 37016

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	3.6
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	3.6
TOTAL PAH'S	3.6

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
METHOD SPIKE RECOVERY REPORT
CITY OF ST. LOUIS PARK, MN

ppt PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-02 ERT NO.: 37017

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-02 ERT NO.: 37018

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	12
BENZO (A) ANTHRACENE	ND
CHRYSENE	14
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	4.3
TOTAL CARCINOGENIC PAH	30

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	6.9
NAPHTHALENE	54
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	11
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	9.1
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	6.0
PERYLENE	ND
TOTAL OTHER PAH	87
TOTAL PAH'S	117

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: MB860527 ERT NO.: 37134

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	<5.0
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	<1.2
FLUORENE	1.5
DIBENZOTHIOPHENE	ND
PHENANTHRENE	5.8
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	7.3
TOTAL PAH'S	7.3

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SURROGATE RECOVERY REPORT
CITY OF ST. LOUIS PARK, MN

ppt PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-02 ERT NO.: 37018

PARAMETERS	SPIKE LEVEL (NG/L)	% RECOVERY
NAPHTHALENE	110	49
FLUORENE	21.1	43
CHRYSENE	24.2	60
BENZO (G,H,I) PERYLENE	22.4	9
INDENE	24.6	28
QUINOLINE	23.5	52
BENZO (E) PYRENE	20.4	12
2-METHYLNAPHTHALENE	21.2	50
AVERAGE % RECOVERY		38

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: T-02 ERT NO.: 37014

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	60	42-102
FLUORENE - D10	9.5	140	60-128
CHRYSENE - D12	9.8	19	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: W-02 ERT NO.: 37015

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	35	42-102
FLUORENE - D10	9.5	103	60-128
CHRYSENE - D12	9.8	80	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: B-02 ERT NO.: 37016

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	24	42-102
FLUORENE - D10	9.5	789	60-128
CHRYSENE - D12	9.8	76	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-02 ERT NO.: 37017

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	27	42-102
FLUORENE - D10	9.5	150	60-128
CHRYSENE - D12	9.8	26	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-02 ERT NO.: 37018

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	34	42-102
FLUORENE - D10	9.5	96	60-128
CHRYSENE - D12	9.8	58	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MB860527 ERT NO.: 37134

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	35	42-102
FLUORENE - D10	9.5	84	60-128
CHRYSENE - D12	9.8	61	10-54

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